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AUTHOR Martin, Larry L.; Hershey, Myrliss  
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## ABSTRACT

Studied was the effectiveness of biofeedback techniques in reducing the hyperactive behavior of five hyperactive and four nonhyperactive children (all in elementary level learning disability classes). After 10 15-minute biofeedback training sessions over an 8-week period, Ss learned to raise their finger temperatures an average of 12.92 degrees (indicating muscle relaxation), and increased their attending behavior by 17.4%. Slight increases were also noted in self-concept and teachers' ratings of classroom performance. (Author/IM)

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AN EXPLORATORY INVESTIGATION OF THE EFFECT ON A  
BIOFEEDBACK TECHNIQUE WITH HYPERACTIVE, LEARNING DISABLED CHILDREN

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By Larry L. Martin

and

Myrliss Hershey

Kansas State University

Summary. A study of five hyperactive, learning disabled and four non-hyperactive learning disabled children was carried out to see if biofeedback techniques could be used to teach relaxation, increase attending to task, raise self-concept, and improve teachers' ratings of academic and personal behaviors. After 10 fifteen-minute biofeedback training sessions over an eight-week period, the subjects learned to raise their finger temperatures an average of  $12.92^{\circ}$  and increased their attending behavior by 17.4 percent. Slight increases were also noted in self-concept and teachers' ratings of classroom performance. Further study seemed needed.

Recent research shows that blood flow, brain wave rhythms, muscle tension, heartbeat, and many other so-called involuntary processes may be voluntarily controlled (Barber, 1971). Many are the implications for education, since it appears that mental states which enhance learning may be self-induced or changed at will.

The specific purpose of this study was to reduce the hyperactive behavior of selected subjects from self-contained Learning Disabilities classrooms in a public school by training them to raise their finger temperatures using biofeedback techniques. This relationship between hyperactivity and finger temperature is based upon the premise that the flow of blood to the fingers is increased as muscles in the body, especially the arms, are relaxed, and decreased when the muscles are tensed. Increased blood flow raises the temperature of the fingers. It was felt that through the use of biofeedback techniques a subject could be trained to recognize cues that muscles are tensed or relaxed, and in turn, how to relax them. In this way he could relax himself whenever the cues indicating tension begin to appear. This should result in decreased hyperactive movements by the subjects.

## METHOD

Three students from a primary level learning disability classroom and two students from an intermediate level learning disability classroom were selected as subjects on the basis of teachers' assessment, using David's "Objective Instrument for Assessing Hyperkinesis in Children" (1971) as a checklist. Two additional students in each of the above classrooms were designated "normal" (in terms of hyperactivity) and used as controls. The behavior of the nine subjects was observed through a one-way mirror and systematically checked on an experimenter-made monitoring checklist for the same 20 minute time period for three days to get a baseline of hyperactive-type behavior and attentiveness to tasks.

A preliminary training session was conducted with each experimental subject for the purpose of establishing rapport and acquainting the subject with the temperature-trainer biofeedback instrument. The Temperature Feedback Trainer, Model T2-P, was manufactured by Cystec Inc., Lawrence Kansas. A sensor was attached to the third finger of the dominant hand to detect fluctuations in finger temperature. By watching a meter attached to the sensor the trainer is able to keep tabs on the flow of blood into the subjects' hands: the more blood that flows into the hands, the warmer the temperature of the hands. The feedback training consisted of 10 fifteen-minute biofeedback sessions with each of the five experimental subjects over a period of eight weeks. The sessions included:

1. Approximately six minutes of conversation and practice with the temperature-trainer instrument. A self-evaluation questionnaire was administered during the first and the final training sessions.
2. Approximately seven minutes of repeating phrases such as "I feel quite quiet. . .I'm beginning to to feel quite relaxed. . ."
3. Two minutes of wrap-up, answering, etc.

Each subject's classroom teacher filled out behavior-rating checklists before the first and after the last training session. The sessions were conducted over an eight week period that included a Christmas vacation week. Following the last training session, the nine subjects were again observed through a one-way mirror for hyperactive-type behavior and attentiveness following the same procedures described previously.

### RESULTS AND DISCUSSION

The exploratory nature of the study and the small sample made an inferential test of the results inappropriate. The subjects' ability to change their finger temperature, is shown in Table 1. During the first training session, the mean finger temperature at the beginning of the session was  $78.96^{\circ}$  and the mean ending temperature was  $76.00^{\circ}$ . During the last training session eight weeks later, the beginning mean finger temperature was  $76.00^{\circ}$  and the mean ending temperature was  $88.92^{\circ}$ . The increase of  $+12.92^{\circ}$  indicates that the subjects learned to raise their finger temperature after ten training sessions over eight weeks of biofeedback training.

The percent of attending behavior (Table 2) for the treatment group increased from 62.00 to 79.40 for an increase of 17.40 percent. The percent of attending behavior for the control group remained stable with scores of 89.75 and 90.25, a difference of only .50 percent.

Only a slight mean increase in self-concept was found on a pre- and post-training self-concept checklist (Table 2) with scores of 58.60 and 60.00 out of a possible 80 points.

Table 2 also shows that the behavior checklist completed by the teacher indicated that classroom behavior remained approximately the same over the training period with mean ratings of 5.25 and 5.68 out of a possible 9.0 which represents an approximate five percent increase in more desired behavior.

The results of this exploratory investigation seem to warrant further study in the use of biofeedback training with hyperactive, learning disabled children. It appears that such training can be used to help some hyperactive children relax and, in turn, reduce some of the random nervous movements that interfere with paying attention to the task of learning.

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TABLE 1  
Changes in Finger Temperature (Degrees)

ns = 5

<u>First Training Session</u>				<u>Last Training Session</u>		
	<u>Begin.</u>	<u>End.</u>	<u>Diff.</u>	<u>Begin.</u>	<u>End.</u>	<u>Diff.</u>
<u>M</u>	78.96	76.00	-2.96	76.00	88.92	+12.92
S.D.	4.25	3.52		7.47	2.22	

TABLE 2  
Pre- and Post-training Measures of Attending  
Behavior, Self-concept, and Classroom Behavior

	<u>Treatment (N=5)</u>				<u>Control (N=4)</u>			
	<u>Pre</u>		<u>Post</u>		<u>Pre</u>		<u>Post</u>	
	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>	<u>M</u>	<u>S.D.</u>
% attending to task	62.00	25.88	79.40	9.56	89.75	4.11	90.25	1.26
Self-concept	58.60	5.03	60.00	11.05	-	-	-	-
Classroom checklist	5.25	1.16	5.63	.63	-	-	-	-